

K: 100023

APR - 5 2010

### 510(k) SUMMARY

This summary of 510(k) safety and effectiveness information is being submitted in accordance with the requirements of SMMA 1990 and 21 CFR § 807.92.

The assigned 510(k) number is: unknown

**Submitted By:** Medtox Diagnostics, Inc.

1238 Anthony Road

Burlington, North Carolina 27215

**Contact Person:** Phillip Hartzog, Ph.D.

Director, Research & Development

Phone: 336-226-6311, ext. 2863

Fax: 336-229-4471

**Date Prepared:** November 10, 2009

**Proprietary Name:** PROFILE®-V MEDTOXScan® Drugs of Abuse Test System

**Common Name:** Colorimeter, Drugs of Abuse Test System

#### Classification Names:

The applicant test system regulatory classification is Class II; the Classification Panel is Clinical Toxicology (91) and Clinical Chemistry (75). Regulatory information applicable to the test system is provided below:

CFR Section	Product Code
862.2300, Colorimeter, Photometer, Spectrophotometer for Clinical Use	JJQ
862.3100, Amphetamine Test System	DKZ
862.3150, Barbiturate Test System	DIS
862.3170, Benzodiazepine Test System	JXM
862.3250, Cocaine and cocaine metabolite Test System	DIO
862.3620, Methadone Test System	DJR
862.3610, Methamphetamine Test System	DJC
862.3650, Opiate Test System	DJG
862.3650, Opiate Test System (Oxycodone)	DJG

862.3650, Opiate Test System (Buprenorphine)	DJG
862.3100, Amphetamine Test System (Phencyclidine)	LCM
862.3700, Propoxyphene Test System	JXN
862.3870, Cannabinoid Test System	LDJ
862.3910, Tricyclic Anti-depressant Drugs Test System	LFG

**Predicate Device:** PROFILE®-V MEDTOX Scan® Drugs of Abuse Test System (K091454)

### Description of the Device

The PROFILE®-V MEDTOXScan® Drugs of Abuse Test System consists of the PROFILE®-V MEDTOXScan® Test Devices and the MEDTOXScan® Reader. The MEDTOX Scan® Reader is an instrument used as an aid in determining the presence or absence of a colored line associated with the PROFILE®-V MEDTOXScan® one-step drugs of abuse qualitative screening immunoassays for the detection of one or more of the following in human urine: Amphetamines, Barbiturates, Benzodiazepines, Buprenorphine, Cocaine, Methadone, Methamphetamine, Opiates, Oxycodone, Phencyclidine, Propoxyphene, THC (Cannabinoids) and Tricyclic Antidepressants or their metabolites. All analytes were previously cleared for the test system (K091454) except for the buprenorphine and opiates with the 2,000 ng/mL cutoff (OPI 2k). OPI 2K was previously cleared for visual use (K992111).

The MEDTOXScan® reader scans the device and utilizes a contact imaging sensor (CIS) to capture relative line intensities. Software algorithms and barcodes are used to identify the type of device to be read, the analyte(s) associated with the device and whether the presence or absence of a line is associated with a negative or positive result. The results of the scans are displayed on the MEDTOXScan® screen or optionally can be printed.

### Intended Use

The PROFILE®-V MEDTOXScan® Drugs of Abuse Test System consists of the PROFILE®-V MEDTOXScan® Test Devices and the MEDTOXScan® Reader. The PROFILE®-V MEDTOX Scan® Test Devices are one-step immunochromatographic tests for the rapid, qualitative detection of one or more of the following in human urine: Amphetamines, Barbiturates, Benzodiazepines, Buprenorphine, Cocaine, Methadone, Methamphetamine, Opiates, Oxycodone, Phencyclidine, Propoxyphene, THC (Cannabinoids), and Tricyclic Antidepressants or their metabolites. The PROFILE®-V MEDTOXScan® Test Devices can only be used with the MEDTOXScan® Reader. The MEDTOX Scan® Reader is an instrument used to interpret and report the results of the PROFILE®-V MEDTOXScan® Test Device. PROFILE®-V MEDTOXScan® Test Devices cannot be visually read.

The PROFILE®-V MEDTOXScan® Drugs of Abuse Test System is for *in vitro* diagnostic use and is intended for professional use only. It is not intended for use in point-of-care settings.

The PROFILE®-V MEDTOXScan® Drugs of Abuse Test System detects drug classes at the following cutoff concentrations:

AMP Amphetamine	500	OPI Opiates (Morphine)	100 ng/mL
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(d-Amphetamine)	ng/mL		or
BAR Barbiturates (Butalbital)	200 ng/mL		2000 ng/mL
BUP Buprenorphine (Buprenorphine)	10 ng/mL	OXY Oxycodone (Oxycodone)	100 ng/mL
BZO Benzodiazepines (Nordiazepam)	150 ng/mL	PCP Phencyclidine (Phencyclidine)	25 ng/mL
COC Cocaine (Benzoylecgonine)	150 ng/mL	PPX Propoxyphene (Norpropoxyphene)	300 ng/mL
MAMP Methamphetamine (d-Methamphetamine)	500 ng/mL	THC Cannabinoids (11-nor-9-carboxy-r9-THC)	50 ng/mL
MTD Methadone (Methadone)	200 ng/mL	TCA Tricyclic Antidepressants (Desipramine)	300 ng/mL

Configurations of the PROFILE®-V MEDTOXScan® Test Devices may consist of any combination of the above listed and previously cleared drug. Test Devices will have an opiate cutoff of either 100 ng/mL or 2000 ng/mL. Refer to specific product labeling for the combination of drug tests included on that test device.

The PROFILE®-V MEDTOXScan® DRUGS OF ABUSE TEST SYSTEM PROVIDES ONLY A PRELIMINARY ANALYTICAL TEST RESULT. A MORE SPECIFIC ALTERNATE CHEMICAL METHOD MUST BE USED IN ORDER TO OBTAIN A CONFIRMED ANALYTICAL RESULT. GAS CHROMATOGRAPHY / MASS SPECTROMETRY (GC/MS), HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC) OR LIQUID CHROMATOGRAPHY / TANDEM MASS SPECTROMETRY (LC/MS/MS) ARE THE PREFERRED CONFIRMATORY METHODS. CLINICAL CONSIDERATION AND PROFESSIONAL JUDGMENT SHOULD BE APPLIED TO ANY DRUG OF ABUSE TEST RESULT, PARTICULARLY WHEN PRELIMINARY POSITIVE RESULTS ARE OBTAINED.

The MEDTOXScan® Reader includes a Positive QC Test Device, a Negative QC Test Device and a Cleaning Cassette. The MEDTOXScan® Positive and Negative QC Test Devices are intended to detect errors associated with the MEDTOXScan® Reader and a contaminated contact imaging sensor (CIS), and to verify that the CIS cleaning procedure using the MEDTOXScan® Cleaning Cassette effectively removed any contamination (see “Troubleshooting” Section).

#### **Discussion of Technological Characteristics:**

##### **a. Similarities and differences to predicate device**

Both the applicant and the predicate test systems are used to detect the presence of drugs of abuse and their metabolites in human urine. In both systems, a urine sample is added to the test device and allowed to react for a specified period of time, after which an instrument is used to read the test device and interpret and display the test result. Both the applicant and predicate test devices are rapid single use disposable devices that use immunochromatographic lateral flow technology. Both the applicant and predicate test devices utilize gold-conjugated reagents to generate the reddish-purple test and

controls lines, which are read by the instrument.

Overall characteristics of the PROFILE®-V MEDTOXScan® Drugs of Abuse Test System and the predicate device are summarized in Table 1 below:

Similarities		
Item	Additional or Expanded Indications	Predicate, K091454
Intended Use	Determines qualitative positive or negative result from drug of abuse immunoassay screens.	Same
System Procedure	Sample is added to a single use test cassette, which is then read by instrument. Instrument is designed to read multiple single use test cassettes, one at a time.	Same
Measurement Method	Scans the single-use test cassette with contact imaging sensor (CIS) to detect a signal.	Same
Output	Outputs "positive," "negative," and "invalid" test results on paper printout or LCD screen; stores and uploads results.	Same
Differences		
Item	Additional or Expanded Indications	Predicate, K091454
Analytes	Amphetamines, Barbiturates, Benzodiazepines, Buprenorphine, Cocaine, Methadone, Methamphetamine, Opiates, Oxycodone, Phencyclidine, Propoxyphene, THC (Cannabinoids), and Tricyclic Antidepressants	Amphetamines, Barbiturates, Benzodiazepines, Cocaine, Methadone, Methamphetamine, Opiates, Oxycodone, Phencyclidine, Propoxyphene, THC (Cannabinoids), and Tricyclic Antidepressants

*Table 1. Comparison of Similarities and Differences for the PROFILE®-V MEDTOXScan® Drugs of Abuse Test System and predicate device.*

Performance characteristics for the common analytes are exactly the same and data are on file at Medtox. They have not been altered by the addition of the new analytes.

The following laboratory performance studies were conducted to determine the substantial equivalence of the PROFILE®-V MEDTOXScan® Drugs of Abuse Test System to the predicate device with regard to the additional analytes. As with previous Medtox submissions, these studies included confirmation of the analyte concentration by use of GC/MS or LC/MS/MS methods:

#### **Discussion of Non-Clinical Tests Performed for Determination of Substantial Equivalence:**

See K091454 for Amphetamines, Barbiturates, Benzodiazepines, Cocaine, Methadone, Methamphetamine, Opiates (100 ng/mL), Oxycodone, Phencyclidine, Propoxyphene, THC, Tricyclic

Antidepressants and (Cannabinoids), Performance studies have been conducted for the addition of Buprenorphine and Opiates (2,000 ng/mL) through Medtox's internal Design Control process. Performance characteristics are exactly the same and data are on file at Medtox.

The following laboratory performance studies were conducted to determine the substantial equivalence of the PROFILE®-V MEDTOXScan® Drugs of Abuse Test System to the predicate:

Performance of the PROFILE®-V MEDTOX Scan® Drugs of Abuse Test System around the specific cutoff for Buprenorphine and Opiates (2,000 ng/mL) was evaluated by testing standard drug solutions diluted in drug-free urine in triplicate on 5 different intervals by 3 in-house operators using different readers (45 determinations for each level). Drug free urine was also tested on each interval. The results were interpreted at ten minutes by the MEDTOX Scan® Reader and are summarized for each drug in Table 2 below:

**Table 2. Sensitivity/Precision/Distribution of Random Error**

<b>Sample Concentration (ng/mL)</b>	<b>% of Cutoff</b>	<b>Number of Observations</b>	<b># Neg</b>	<b># Pos</b>
<b>Opiates (2,000)</b>				
0	Neg	45	45	0
1,000	50%	45	45	0
1,500	75%	45	31	14
2,500	125%	45	0	45
3,000	150%	45	0	45
<b>Buprenorphine (10)</b>				
0	Neg	45	45	0
5.0	50%	45	45	0
7.5	75%	45	30	15
12.5	125%	45	0	45
15.0	150%	45	0	45

Other Technical Performance Documentation for the MEDTOX Scan® include:

- Influence of Temperature
- Influence of Humidity
- Factory Calibration
- Electrical and EMC Testing
- Validation and stability of QC Control Cassette
- Validation and stability of Cleaning Cassette

Analytical specificity (cross reactivity and interference) data are summarized below.

### **Related Compounds and Cross Reactants**

The metabolites and reacting compounds shown in Table 3 below were evaluated on the PROFILE®-V MEDTOXScan® Drugs of Abuse Test System for interference or cross reactivity with Buprenorphine and Opiates (2,000 ng/mL). Reference standards for the various metabolites and compounds were prepared in negative urine samples. Results are expressed as the approximate minimum concentration required to produce a positive result in the indicated assay. Compounds that reacted with the test are listed first, and related compounds that did not react with the highest concentration tested are listed second as Negative at 100,000 ng/mL. The “% Cross-Reactive” values were calculated from the cut-off level for the calibrator used for each test (approximate 50% positive rate) divided by the lowest reported level found to react in the same test (greater than 66% positive rate).

**Table 3. Related Compounds and Cross Reactants  
in the MEDTOX Scan® Drugs of Abuse Test System**

<b>Buprenorphine (BUP) (<i>Buprenorphine</i>, 10 ng/mL)</b>		
<b>Compound</b>	<b>Result</b>	<b>% Cross-Reactive</b>
Buprenorphine-glucuronide	Positive at 20 ng/mL	50%
Norbuprenorphine	Positive at 250 ng/mL	4%
Norbuprenorphine-glucuronide	Positive at 500 ng/mL	2%
Codeine	Negative at 100,000 ng/mL	None Detected
Diacetylmorphine	Negative at 100,000 ng/mL	None Detected
Hydrocodone	Negative at 100,000 ng/mL	None Detected
Hydromorphone	Negative at 100,000 ng/mL	None Detected
Levorphanol	Negative at 100,000 ng/mL	None Detected
6-Monoacetylmorphine	Negative at 100,000 ng/mL	None Detected
Morphine	Negative at 100,000 ng/mL	None Detected
Naloxone	Negative at 100,000 ng/mL	None Detected
Naltrexone	Negative at 100,000 ng/mL	None Detected
Oxycodone	Negative at 100,000 ng/mL	None Detected
Oxymorphone	Negative at 100,000 ng/mL	None Detected
Thebaine	Negative at 100,000 ng/mL	None Detected
<b>Opiates (OPI) (<i>Morphine</i>, 2,000 ng/mL)</b>		
<b>Compound</b>	<b>Result</b>	<b>% Cross-Reactive</b>
Codeine	Positive at 900 ng/mL	222%
Diacetylmorphine	Positive at 2500 ng/mL	80%
Dihydrocodeine	Positive at 3800 ng/mL	53%

Ethylmorphine	Positive at 600 ng/mL	333%
Hydrocodone	Positive at 1400 ng/mL	143%
Hydromorphone	Positive at 1900 ng/mL	105%
Levorphanol	Positive at 5000 ng/mL	40%
6-Monoacetylmorphine	Positive at 3800 ng/mL	53%
Morphine 3-β-D-Glucuronide	Positive at 5000 ng/mL	40%
Morphine 6-β-D-Glucuronide	Positive at 6000 ng/mL	33%
Norcodeine	Positive at 40,000 ng/mL	5%
Thebaine	Positive at 2500 ng/mL	80%
Apomorphine	Negative at 100,000 ng/mL	None Detected
Nalorphine	Negative at 100,000 ng/mL	None Detected
Naloxone	Negative at 100,000 ng/mL	None Detected
Naltrexone	Negative at 100,000 ng/mL	None Detected
Oxycodone	Negative at 100,000 ng/mL	None Detected
Oxymorphone	Negative at 100,000 ng/mL	None Detected

### **Interference Data**

#### **pH and Specific Gravity:**

The PROFILE®-V MEDTOXScan® Drugs of Abuse Test System was assayed with three negative clinical samples with pH values of 4.0, 7.0 and 9.0 ± 0.1. Each sample was assayed in triplicate. The pH samples were fortified with drug concentrations that were the maximum level to give a strong negative (95% or greater negative) result (10-50% of cut-off, see Sensitivity data), and the minimum level above the cut-off to give a strong positive (95% or greater positive) result (125-150% of cut-off, see Sensitivity data). All three pH samples gave negative results when fortified to the maximum strong negative level for each drug, and all gave positive results when fortified to the minimum strong positive level for each drug.

The PROFILE®-V MEDTOXScan® Drugs of Abuse Test System was assayed with three samples with specific gravity values of 1.003, 1.015 and 1.030 ± 0.001. Each sample was assayed in triplicate. The specific gravity samples were fortified with drug concentrations as described above for pH to give strong negative and strong positive results. All three specific gravity samples gave negative results when fortified to the maximum strong negative level for each drug, and all gave positive results when fortified to the minimum strong positive level for each drug.

#### **Common Drugs:**

Drug free urine samples were spiked with drug concentrations that were the maximum level to give a strong negative (95% or greater negative) result (10-50% of cut-off, see Sensitivity data), and the minimum level above the cut-off to give a strong positive (95% or greater positive) result (125-150% of

cut-off, see Sensitivity data). 100,000 ng/mL of the common drugs were then added to the preparation and assayed by the PROFILE®-V MEDTOXScan® Drugs of Abuse Test System. If a common compound name is followed by the abbreviation “OPI”, then it has cross-reactivity to the specified drug test (see “Related Compounds and Cross Reactants”) and therefore was not assayed for interference for that drug test. Samples were evaluated in triplicate by in-house operators. None of the common drugs listed in Table 4 below affected the expected results.

**Table 4. Common Drugs Evaluated with the MEDTOXScan® Drugs of Abuse Test System**

Acetylsalicylic Acid	Chlorpheniramine	Morphine-OPI
Acetaminophen	Cocaine	Phenobarbital
Brompheniramine maleate	Dextromethorphan	Phenytoin (Diphenylhydantoin)
Caffeine	Doxylamine	d-Pseudoephedrine
Carbamazepine	Ibuprofen	Salicylic Acid

#### **Discussion of Clinical Tests Performed for Determination of Substantial Equivalence:**

The accuracy of the PROFILE®-V MEDTOXScan® Drugs of Abuse Test System was evaluated by assaying a panel of blind coded clinical urine samples containing varying concentrations of drugs and comparing to GC/MS or LC/MS/MS results. The samples were obtained from MEDTOX Laboratories and grouped in the following manner: Negative samples were screened negative by KIMS (Kinetic Interaction of Microparticles in Solution), and 10% were confirmed negative by GC/MS or LC/MS/MS; Below Cutoff Negative samples that fell between limit of detection or quantitation and 50% of cutoff; Near Cutoff Negative samples that fell between 50% of the cutoff concentration and the cutoff concentration; Near Cutoff Positive samples that fell between the cutoff concentration and 150% of the cutoff concentration; and High Positive samples that were greater than 150% of cutoff concentration. Drug concentrations were assayed by GC/MS or LC/MS/MS. Concentrations used to assign the cutoff ranges for each drug were determined by summing the GC/MS or LC/MS/MS levels measured for all test-specific analytes found in the sample. The testing was performed by in-house operators. The results were interpreted at ten (10) minutes by the MEDTOXScan® reader. No false positives were observed in the absence of drug. The results are summarized in Table 5 below.

**Table 5.**  
**PROFILE®-V MEDTOXScan® Drugs of Abuse Test System**  
**vs stratified GC/MS or LC/MS/MS Values**

<b>DRUG</b>	<b>P-V MEDTOXScan® Drugs of Abuse Test System</b>	<b>No Drug</b>	<b>Low negative by GC/MS or LC/MS/MS (Less than -50%)</b>	<b>Near Cutoff Negative (between -50% and cutoff)</b>	<b>Near Cutoff Positive (Between cutoff and +50%)</b>	<b>High Positive (greater than +50%)</b>	<b>% Agreement</b>
<b>BUP (10)</b>	Positive	0	0	0	4	36	100%
	Negative	40	0	4	0	0	100%
<b>OPI</b>	Positive	0	0	1	4	36	100%



(2,000)	Negative	40	4	3	0	0	98%
All	Positive	0	0	1	8	72	100%
Drugs	Negative	80	4	7	0	0	99%

For samples giving preliminary positive results below the cutoff and negative results above the cutoff, the assayed values are detailed in Table 6 below:

**Table 6. ACCURACY/SUMMARY of DISCORDANT RESULTS**

Drug and Cutoff Value (ng/mL)	P-V MEDTOXScan Drugs of Abuse Test System	GC/MS or LC/MS/MS Value (Drug or Metabolite, ng/mL)
OPI (2,000)	OPI positive	Morphine at 1,375 ng/mL

**Conclusions:**

The PROFILE®-V MEDTOXScan® Drugs of Abuse Test System has the same intended use and similar technological characteristics as the predicate device. Moreover, bench testing contained in this submission demonstrates that any differences in their technological characteristics do not raise any new issues of safety or effectiveness. Thus, the PROFILE®-V MEDTOXScan® Drugs of Abuse Test System is substantially equivalent to the predicate device.





DEPARTMENT OF HEALTH & HUMAN SERVICES

Food and Drug Administration  
10903 New Hampshire Avenue  
Document Mail Center – WO66-0609  
Silver Spring, MD 20993-0002

Medtox Diagnostics, Inc.  
c/o Phillip Hartzog, Ph.D.  
Director, R&D  
1238 Anthony Road  
Burlington, NC 27215

APR 05 2010

Re: k100023  
Trade Name: Profile®-V MedtoxScan® Drugs of Abuse Test System  
Regulation Number: 21 CFR §862.3650  
Regulation Name: Opiate test system  
Regulatory Class: Class II  
Product Codes: DJG  
Dated: December 31, 2009  
Received: January 5, 2010

Dear Dr. Hartzog:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to such additional controls. Existing major regulations affecting your device can be found in Title 21, Code of Federal Regulations (CFR), Parts 800 to 895. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Parts 801 and 809); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803); and good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820).

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If you desire specific advice for your device on our labeling regulation (21 CFR Part 801), please contact the Office of *In Vitro* Diagnostic Device Evaluation and Safety at (301) 796-5450. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR Part 807.97). For questions regarding postmarket surveillance, please contact CDRH's Office of Surveillance and Biometric's (OSB's) Division of Postmarket Surveillance at (301) 796-5760. For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to <http://www.fda.gov/MedicalDevices/Safety/ReportaProblem/default.htm> for the CDRH's Office of Surveillance and Biometrics/Division of Postmarket Surveillance.

You may obtain other general information on your responsibilities under the Act from the Division of Small Manufacturers, International and Consumer Assistance at its toll-free number (800) 638-2041 or ( 301 ) 796-5680 or at its Internet address <http://www.fda.gov/MedicalDevices/ResourcesforYou/Industry/default.htm>.

Sincerely yours,

A handwritten signature in black ink, appearing to be 'CCH', with a long horizontal flourish extending to the right.

Courtney C. Harper, Ph.D.  
Director  
Division of Chemistry and Toxicology  
Office of *In Vitro* Diagnostic Device  
Evaluation and Safety  
Center for Devices and Radiological Health

Enclosure

## Indication for Use

510(k) Number (if known): unknown

Device Name: PROFILE®-V MEDTOXScan® Drugs of Abuse Test System

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Prescription Use   X    
(21 CFR Part 801 Subpart D)

And/Or

Over the Counter Use         
(21 CFR Part 801 Subpart C)

Carol Benson  
Division Sign-Off  
Office of In Vitro Diagnostic Device  
Evaluation and Safety  
510(k) K100023

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Prescription Use   X    
(21 CFR Part 801 Subpart D)

And/Or

Over the Counter Use         
(21 CFR Part 801 Subpart C)

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Office of In Vitro Diagnostic Device  
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510(k) K100023